HB 19-1199

Legislative Council Staff

Nonpartisan Services for Colorado's Legislature

Greenhouse Gas Emissions Report

Drafting Number:	LLS 19-0609	**Date:**	October 7, 2019
Prime Sponsors:	Rep.Valdez A. Sen. Pettersen; Winter	**Analyst:**	Legislative Council Staff (303) 866-3521 GHGReports.ga@state.co.us
Bill Topic:	**COLORADO CLEAN PASS ACT**		
Sectors Impacted:	X Electric Power X Transportation ☐ Residential / Commercial / Industrial Fuel Use ☐ Industrial Processes ☐ Waste Management		☐ Natural Gas and Oil Systems ☐ Mining ☐ Agriculture ☐ Land Use / Forestry
Net Change:	☐ Increase X Decrease ☐ Indeterminate ☐ Minimal		
Report Status:	This report reflects the introduced bill.		

Emissions Summary

This bill incentivizes the purchase of electric vehicles by reducing travel costs of operators driving in express lanes. Although the financial incentive generated by this bill is lower than other currently-available financial incentives, it may result in additional plug-in electric motor vehicle purchases. This bill may therefore indirectly reduce fuel consumption by new, eligible electric vehicles, thereby reducing tailpipe greenhouse gas emissions. This emissions reduction will be partially offset by an increase in electricity consumption for charging. The bill is therefore anticipated to result in an indirect decrease in greenhouse gas emissions.

Key Provisions Impacting Greenhouse Gas Emissions

This bill authorizes operators of an eligible, plug-in electric motor vehicle to pay an annual express lane access fee in exchange for the right to operate the vehicle on express lanes, without regard to the number of persons in the vehicle. Registered, eligible vehicles may drive for free on any express lane designated as a high occupancy vehicle lane and for a reduced toll on any express lane designated as a toll lane or high occupancy toll lane.

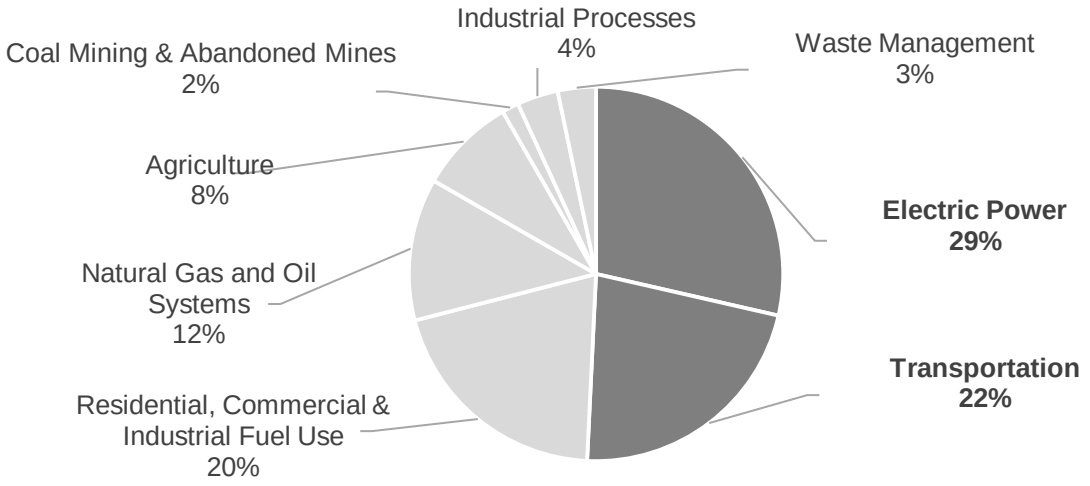
Background

The following section provides information about greenhouse gases and the emissions sectors affected by this bill.

Purpose. Greenhouse gases trap heat in earth's atmosphere and contribute to global climate change. Greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases. Greenhouse gases are typically reported and measured in carbon dioxide equivalent according to each gas's global warming potential.[1] As required by House Bill 19-1188, this greenhouse gas emissions report identifies whether a measure is likely to directly cause a net increase or decrease in greenhouse gas pollution within a ten-year period following enactment, and identifies any new sources of greenhouse gas emissions, any increase or decrease in emissions from existing sources, and any impact on sequestration of emissions.

Colorado emissions. The Colorado Department of Public Health and Environment publishes an inventory of greenhouse gas emissions for the state, with the most recent draft inventory published in 2019. The inventory classifies and measures greenhouse gases by emissions sector using national and state level data. In Colorado, total greenhouse gas emissions in 2015 were estimated to be 127.0 million metric tons of carbon dioxide equivalent. The transportation sector, the primary sector impacted by House Bill 19-1199, accounted for 28.2 million metric tons of carbon dioxide equivalent in 2015, or 22 percent of total 2015 greenhouse gas emissions. The electric power sector will also be impacted by the bill, as additional electric vehicles will require additional electricity for charging. Figure 1 shows a breakdown of greenhouse gas emissions in Colorado by sector, with the sectors affected by this bill highlighted.

Figure 1
Colorado Greenhouse Gas Emissions by Sector, 2015



Note: The Land Use, Land Use Change, and Forestry Sector sequestered 6.9 million metric tons of carbon dioxide equivalent in 2015, offsetting 5.4% of total greenhouse gas emissions
Source: Colorado Department of Public Health and Environment

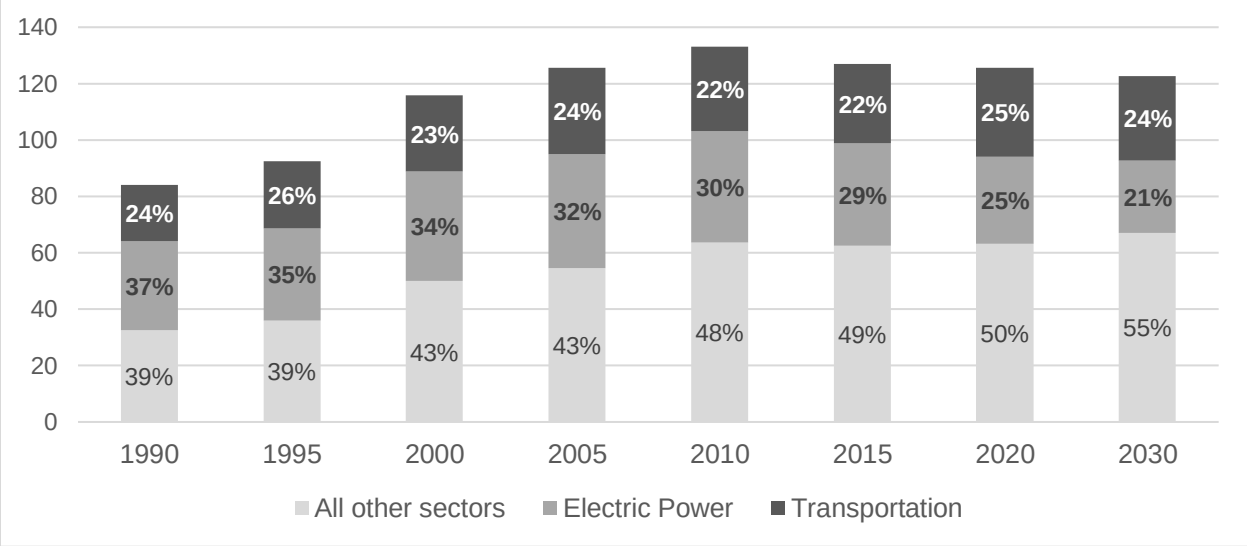
[1]For instance, methane is a potent greenhouse gas that is 25 times more effective at trapping heat than carbon dioxide. Therefore, 1 metric ton of methane is calculated as being equivalent to 25 metric tons of carbon dioxide.

Transportation emissions. Motor vehicles generate greenhouse gas emissions (carbon dioxide, nitrous oxide, and methane) via the combustion of fossil fuels. Emissions from the transportation sector are influenced by a number of factors such as the number and type of vehicles, fuel economy standards, fuel type, and vehicle miles traveled. Greenhouse gas emissions from the transportation sector in Colorado grew steadily from 1990 to 2005, reflective of the growing population of the state. While transportation-related emissions have stabilized somewhat in recent years, the transportation sector is projected to bypass the electric power sector in 2020 to become Colorado's largest source of emissions.

Electric power emissions. Converting from gasoline-powered engines to electric vehicles will reduce tailpipe emissions, but a portion of these emissions will be offset by an increase in electricity consumption. Combusting fossil fuels for electricity generation emits greenhouse gases. Emissions are influenced by electricity consumption, fuel type (e.g., coal, natural gas) and emissions factors. Historically, the electric power sector contributed the largest portion of Colorado's greenhouse gas emissions, between 22 and 26 percent of total emissions. Emissions from the electric power sector are projected to decline in 2020, becoming the second largest emissions sector after transportation.

Figure 2 shows the estimated and projected greenhouse gas emission from the transportation and electric power sector, and total greenhouse gas emissions for Colorado from 1990 to 2030.

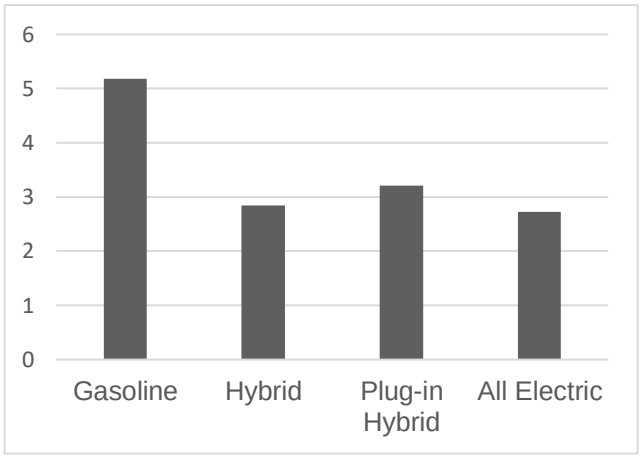
Figure 2
Transportation and Electric Power Sector GHG Emissions as Proportion of Total GHG Emissions
(Millions of metric tons of carbon dioxide equivalent)



Source: CDPHE Draft 2019 Colorado Greenhouse Gas Inventory Report, 2019 draft

Plug-in electric motor vehicles. Plug-in electric motor vehicles (including all-electric and plug-in hybrid vehicles) emit less greenhouse gases than conventional gasoline vehicles. Well-to-wheel greenhouse gas emissions analyses compare emissions across vehicle types including tailpipe emissions and emissions related to fuel production, processing, distribution, and use. Emissions from plug-in hybrid and all-electric vehicles are estimated based on the mix of electricity sources (e.g., coal, natural gas, wind, and solar). The annual emissions from a gasoline-powered vehicle, for instance, is estimated to emit approximately 5.2 metric tons of carbon dioxide equivalent annually. Plug-in hybrids are projected to emit approximately 3.2 metric tons of carbon dioxide equivalent annually, and all-electric vehicles emit approximately 2.7 metric tons of carbon dioxide equivalent annually, as shown in Figure 1.

Figure 1
Annual Well-to-Wheel Greenhouse Emissions per Vehicle
(Metric tons of carbon dioxide equivalent)



Source: United States Department of Energy Alternative Fuels Data Center.

Qualifying plug-in electric vehicles. The number of plug-in electric vehicle sales in Colorado has been steadily growing since 2010, and accounted for nearly 15,000 vehicles in FY 2017-18. The Colorado Energy Office projects that new plug-in electric vehicle sales (including all-electric and plug-in electric hybrid) will grow steadily each year, reaching over 55,000 new vehicle sales in FY 2030-31. Currently, plug-in electric vehicles account for less than one percent of total light vehicles in Colorado. By 2030, electric vehicles are projected to account for over five percent of total light vehicles (0.3 million electric vehicles out of 5.7 million light vehicles).

House Bill 19-1199 places a cap on the total plug-in electric vehicles that may register for the program and access HOV and toll lanes. Table 1 below shows the maximum number of electric vehicles that may register each year under the bill, and shows this figure as a percent of all plug-in electric vehicles, based on forecasted sales. As show in Table 1, electric vehicle sales are forecasted to be approximately 27,000 per year between FY2020-21 and FY 2024-25, reaching over 150,000 vehicles in 2024-25.

Table 1
Qualifying Vehicles under HB 19-1199 and Total Electric Vehicle Sales

Fiscal Year	Maximum Vehicles in EV Program	Forecasted Total Number of Electric Vehicles[2]	Percent of Electric Vehicles that Potentially Qualify
FY 2020-21	10,000	64,468	16%
FY 2021-22	20,000	83,878	24%
FY 2022-23	40,000	104,996	38%
FY 2023-24	80,000	127,557	63%
FY 2024-25	120,000	151,559	79%

Sources: HB 19-1199; Colorado Energy Office; and Legislative Council Staff calculations.

Emissions Assessment

This bill is anticipated to reduce net greenhouse gas emissions by incentivizing the purchase of plug-in electric vehicles. As discussed in more detail below, the bill could impact greenhouse gas emissions in two ways. First, access to free or reduced priced toll lanes and high occupancy vehicle lanes may encourage the purchase of plug-in electric vehicles. To the extent that such purchases result in an electric vehicle replacing an existing or future gasoline-powered vehicle, greenhouse gas emissions will be reduced. Second, additional traffic in HOV attributable to the program may reduce the incentive of other drivers to carpool in order to access the lanes. To the extent that this occurs and more individuals drive a single occupancy vehicle, greenhouse gas emissions will increase.

Increased purchases of plug-in electric motor vehicles. HB 19-1199 provides a financial incentive to purchase electric vehicles, which could result in a net decrease in greenhouse gas emissions. The magnitude of the emissions reduction depends on the extent to which the bill incentivizes the purchase of electric vehicles. Emissions reductions may increase over the first five years of the effective date of the bill (i.e., July 1, 2020) due to the gradual increase in total number of eligible vehicles authorized under this program (see Table 1). Beginning in the fifth year of the program, the maximum eligible vehicles are capped at 120,000. Vehicle owners are only eligible to participate in the program for the first three years of vehicle ownership, however, so as these vehicles are retired from the program, new vehicle owners may enter the program thereby increasing the cumulative impacts on greenhouse gas emissions reductions.

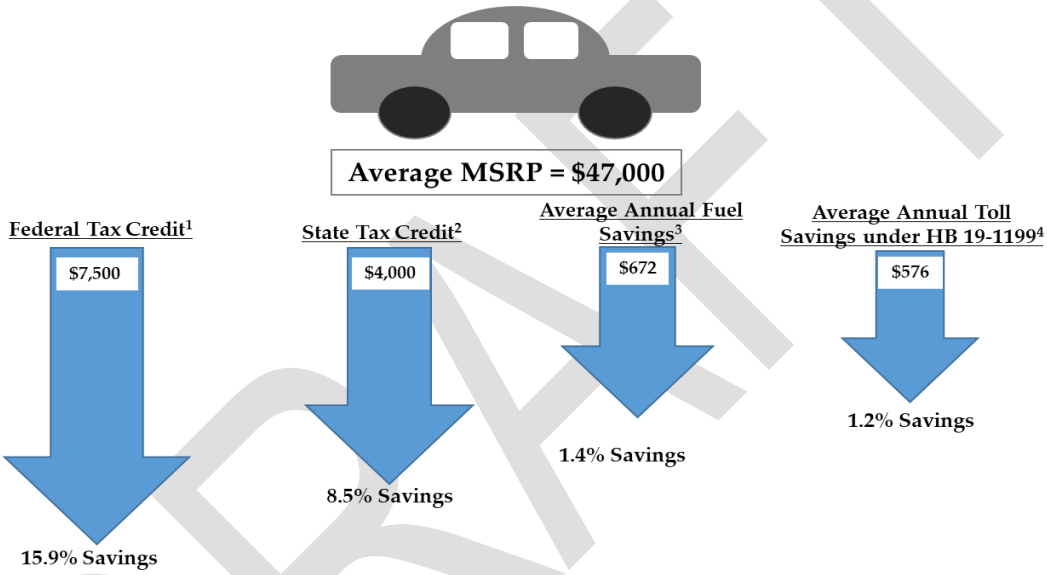
There are currently five corridors in Colorado that offer express lanes, and one corridor that offers a free high occupancy vehicle lane. Of the five tolled express lanes, four could be used for daily commutes.[3] Using average toll rates and assuming that an eligible vehicle owner will use the express lane for a 50 percent reduced fare on 520 trips per year if commuting five days per week, participating vehicle owners will have an average cost savings of $576 per year. Figure 3 below compares this average annual cost savings of a commuter to other financial incentives for electric vehicles, and places

[2] New electric vehicle sales forecasts as projected by the Colorado Energy Office.
[3] One of the express lanes, the MEXL Express Toll, is only open on weekends and holidays.

these savings in context of the cost of purchasing a plug-in electric vehicle, based on the average manufacturer suggested retail price for the top six selling electric vehicle models in 2018.[4]

The average annual toll savings under HB 19-1199 amounts to 1.2 percent of the cost to purchase the vehicle, and is only accrued for the first three years of vehicle ownership. This cost savings is less significant than other financial incentives to purchase a plug-in electric vehicle, including current federal and state tax credits, and the average annual fuel savings of operating an electric vehicle. However, the added incentive generated through HB 19-1199 could motivate the purchase of electric vehicles, thereby reducing greenhouse gas emissions.

Figure 2
Electric Vehicle Cost Savings and Percentage MSRP [5]



Reduced use of express lanes. Allowing eligible plug-in electric motor vehicles to access express lanes for a reduced fare may increase traffic in those lanes. To the extent that this increases driving times, individuals may be less incentivized to carpool in order to access high occupancy vehicle lanes. If that is the case and this results in individuals opting to drive individually versus carpool, greenhouse emissions will increase. Electric vehicles are estimated to account for between two and six percent of the total annual toll counts between 2020 and 2025, and are projected to increase to only

[4]Top selling electric vehicles according to InsideEVs. Monthly Plug-In EV Sales Scorecard: July 2019.
[5] **Notes:** (1) Federal Tax Credit amount is equal to the maximum allowed for new electric vehicle purchases. 26 U.S. Code § 30D. (2) State Tax Credit amount is equal to the amount for purchase of a Category 1 electric motor vehicle in 2020. Section 39-22-516.7(4)(a)(II). (3) Average Annual Fuel Savings is calculated using the Department of Energy's electric eGallon and regular gasoline prices for Colorado, and assumes operators drive 12,000 miles per year, with a conventional vehicle mpg of 24.3 under current CAFE standards. Calculator available at: https://www.energy.gov/eere/electricvehicles/saving-fuel-and-vehicle-costs. (4) Average Annual Toll Savings under HB 19-1199 is calculated using the average toll savings per trip of $1.11 across the four commuter toll roads, assuming commuters work 260 days per year.

eight percent of total trips by 2025 under the program, assuming full participation. Therefore, this bill is not anticipated to result in reduced participation in carpooling. In addition, the bill requires the Colorado Department of Transportation to conduct periodic reviews to ensure that there are no violations of the contractual level of service agreements (i.e., traffic speeds in express lanes) and that toll road operator debt service coverage requirements can be met. Therefore no change in emissions due to less use of HOV lanes is anticipated.

Data Sources and Agencies Contacted

Colorado Energy Office
Department of Transportation
High-Performance Transportation Enterprise